

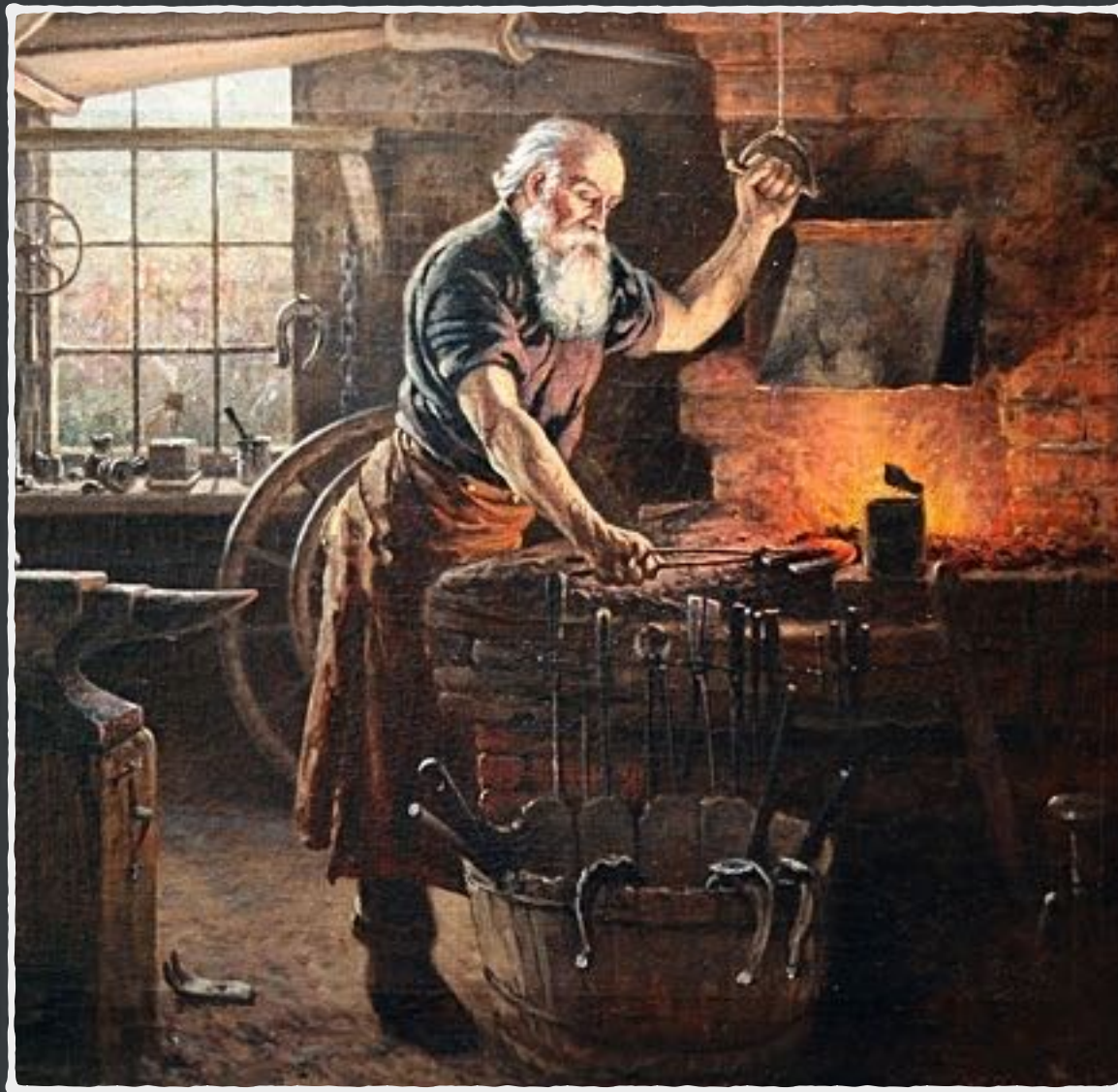
# Transfer of Heat

How heat travels around you



# THE TRANSFER OF HEAT

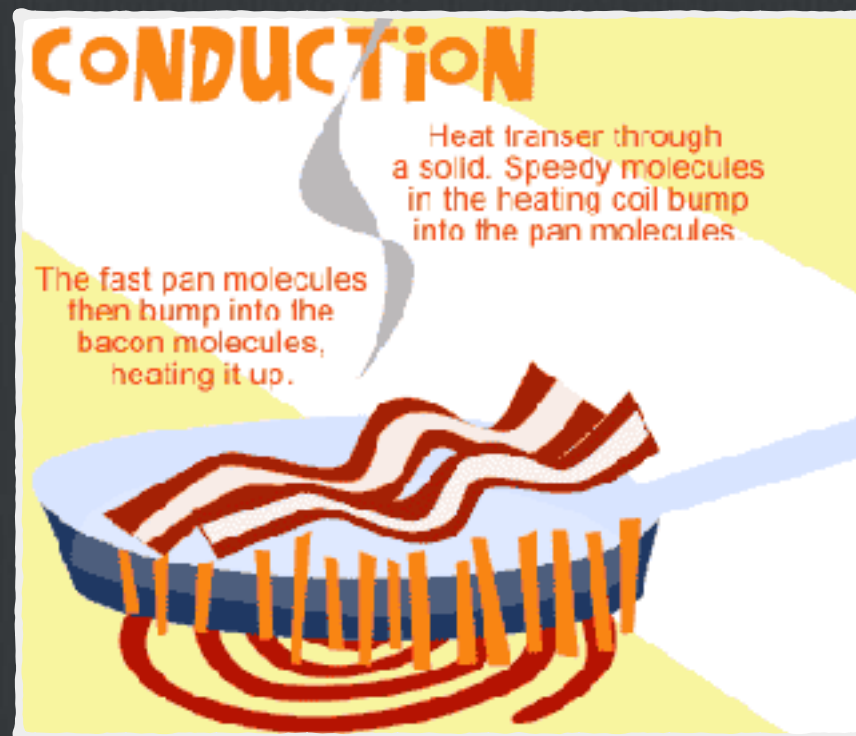
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Blacksmithing is hot work. A piece of iron held in the fire of the forge becomes warmer and begins to glow. At the same time, the blacksmith feels hot air rising from the forge, and his face and arms begin to feel warmer. Each of these movements of energy is a transfer of heat.

# CONDUCTION

In the process of **conduction**, heat is transferred from one particle of matter to another without the movement of the matter. Think of a metal spoon in a pot of water on an electric stove.



The fast-moving particles in the hot electric coil collide with the slow-moving particles in the cool pot. The transfer of heat causes the pot's particles to move faster.

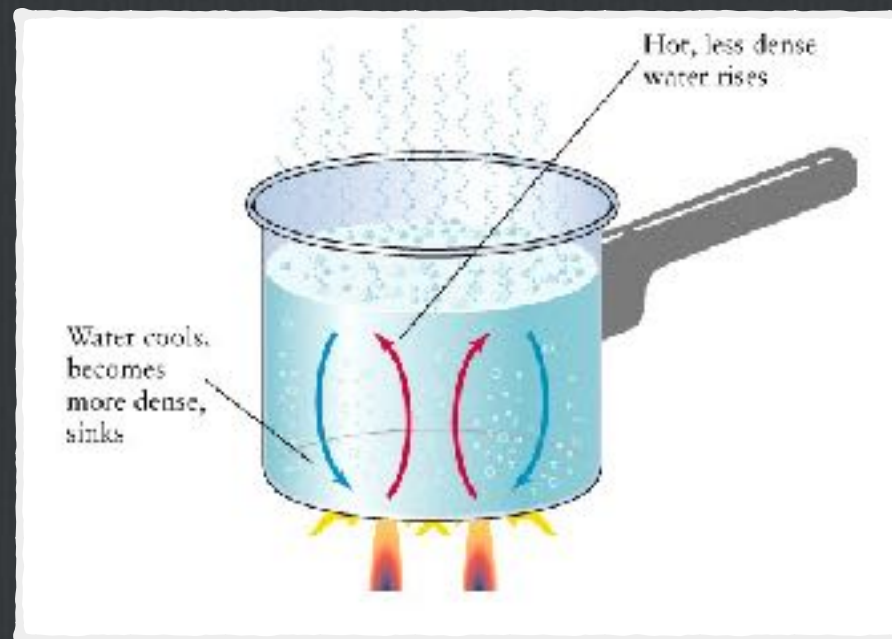
Then the pot's particles collide with the water's particles which in turn collide with the particles in the spoon. As the particles move faster, the metal spoon becomes hotter.



# CONVECTION

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If you watch a pot of hot water on a stove, you will see the water moving. This movement transfers heat within the water. In **convection**, heat is transferred by the movement of currents within a fluid.



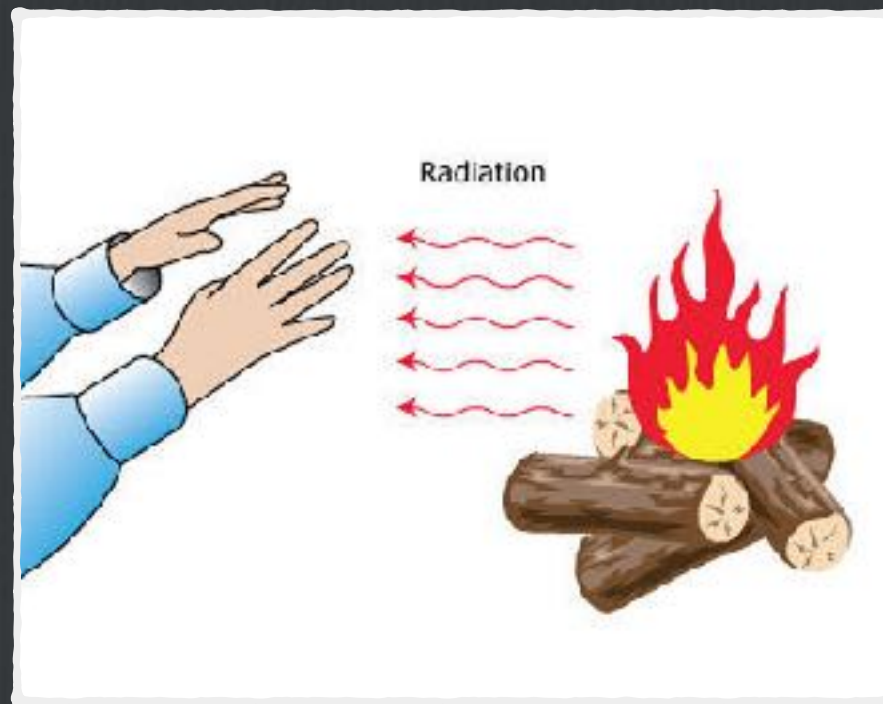
When the water at the bottom of the pot is heated, its particles move faster. The particles also move farther apart. As a result, the heated water becomes less dense. Remember that a less dense fluid will float on top of a more dense one.

The heated water rises, and the surrounding cooler water flows into its place below. This flow creates a circular motion known as a **convection current**.

# RADIATION

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**Radiation** is the transfer of energy by electromagnetic waves. You can feel the radiation from a fire in a fireplace all the way across a room.

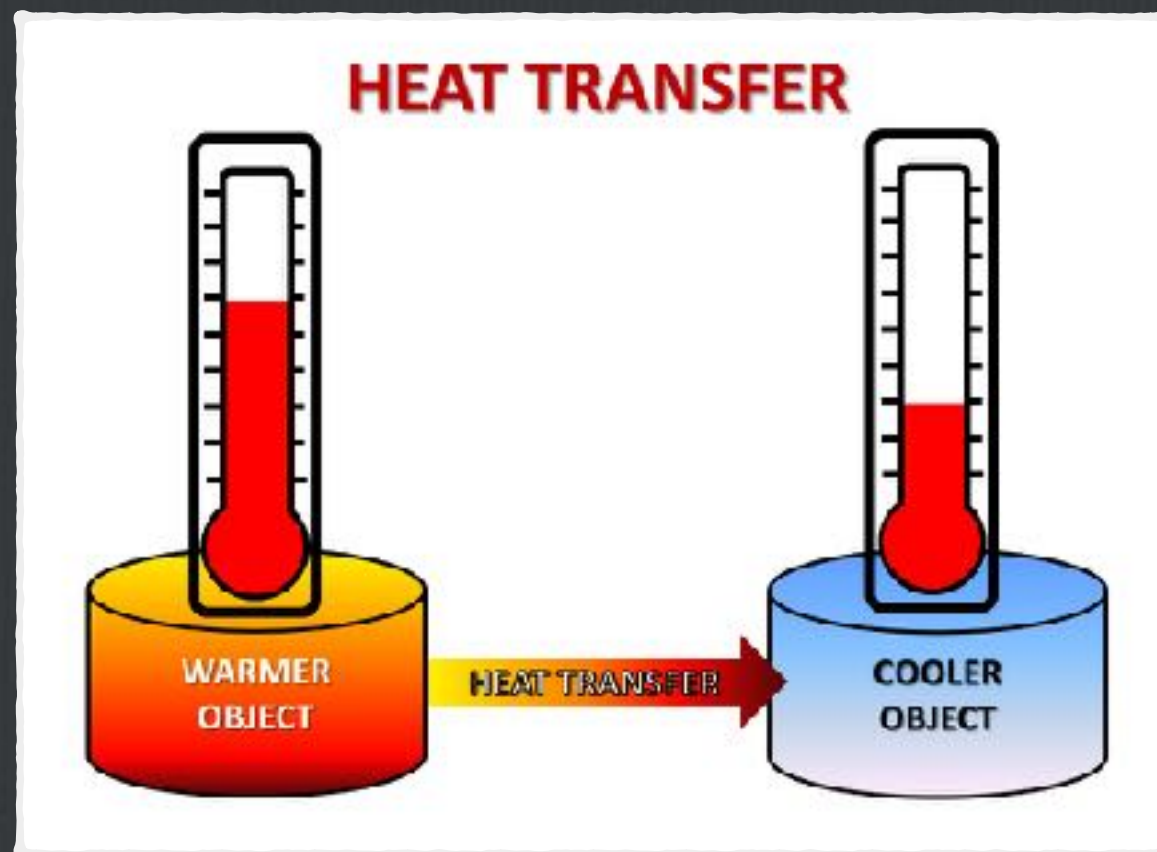


Unlike conduction and convection, radiation does not require matter to transfer thermal energy. All of the sun's energy that reaches Earth travels through millions of kilometers of empty space.



# HEAT MOVES ONE WAY

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If two objects have different temperatures, heat will flow from the warmer object to the colder one. When heat flows into matter, the thermal energy of the matter increases. At the same time, the temperature of the matter losing the heat decreases.

Heat will flow from one object to the other until the two objects have the same temperature. You have probably seen this happen to your food.

# ICE CREAM MAKING

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When you make ice cream, the ingredients used to make it such as milk and sugar are not nearly as cold as the finished ice cream. In an ice cream maker, the ingredients are put into a metal can that is packed in ice.

You might think that the ice transfers cold to the ingredients in the can, but it doesn't. There is no such thing as coldness.

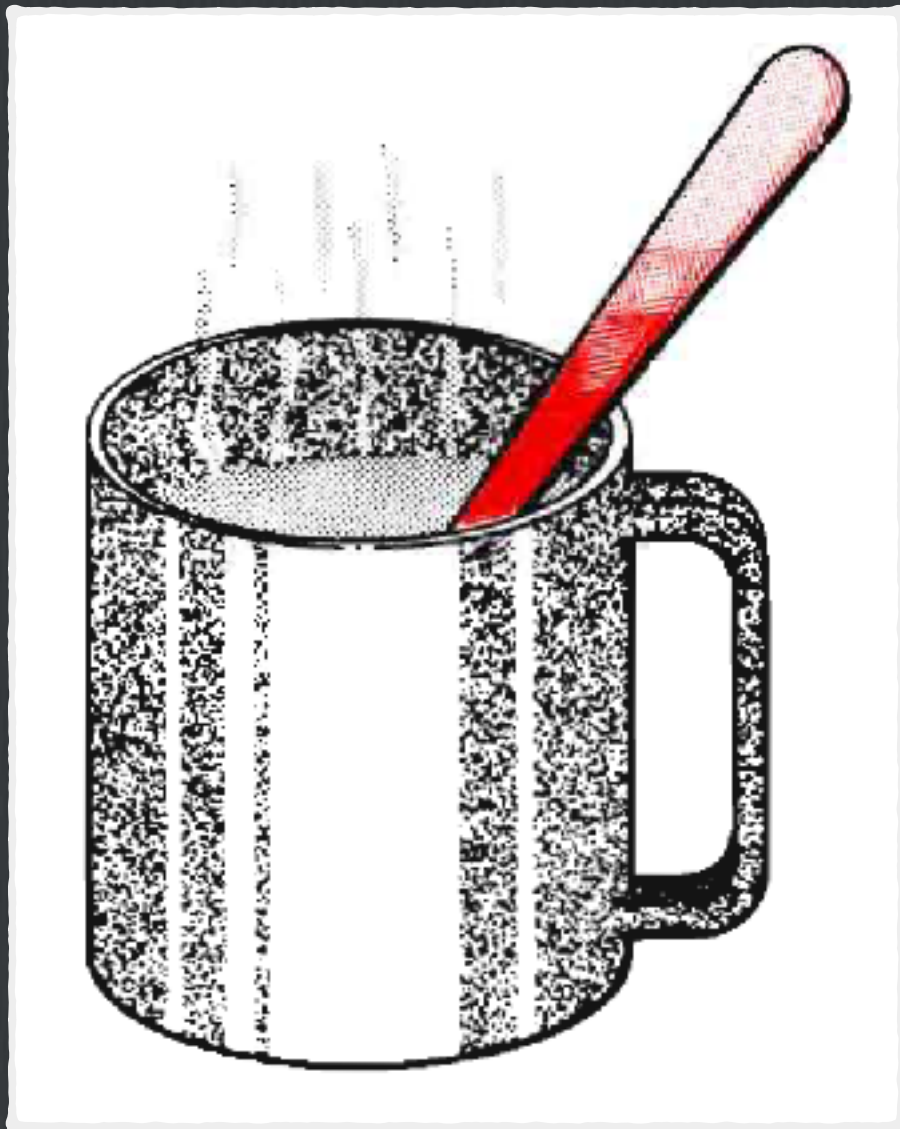
Instead, the ingredients grow colder as thermal energy flows from them to the ice.





# CONDUCTORS

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A material that conducts heat well is called a **conductor**. Metals such as silver and stainless steel are good conductors. A metal spoon conducts heat better than a wooden spoon.

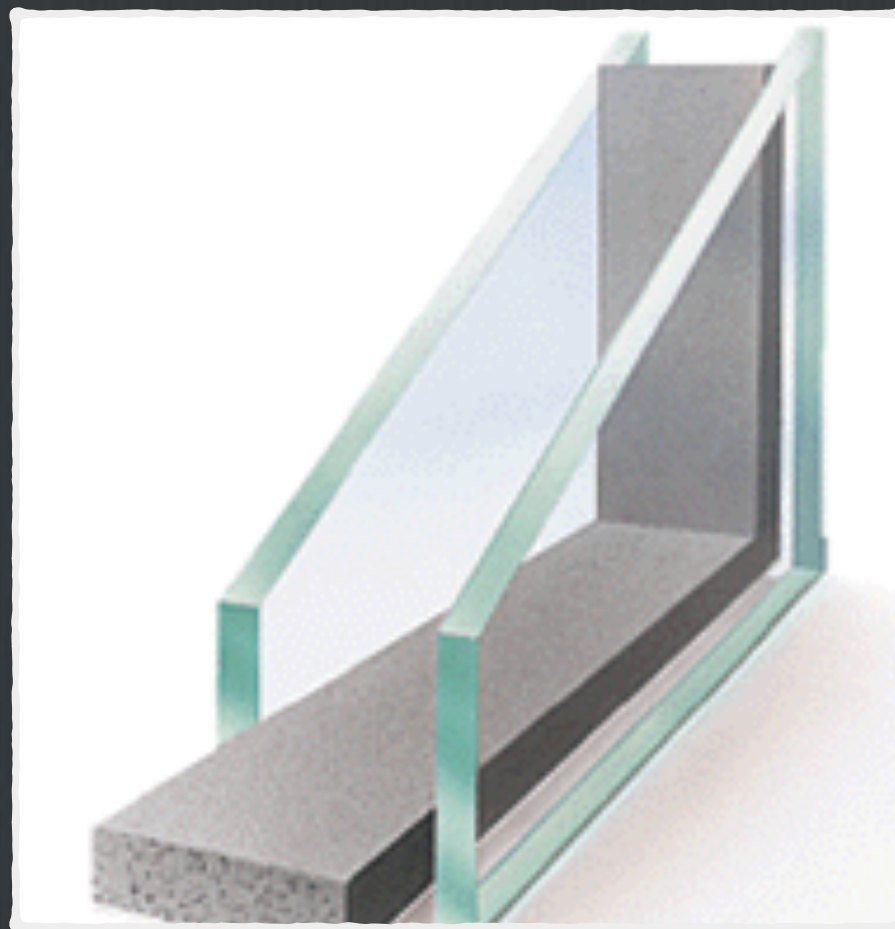
Some materials are good conductors because of the particles they contain and how those particles are arranged. A good conductor, such as a tile floor, feels cool to the touch because it easily transfers heat away from your skin.



# INSULATORS

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A material that does not conduct heat well is called an **insulator**. Wood, wool, straw, and paper are good insulators. So are the gases in air. Clothes and blankets are insulators that slow the transfer of heat out of your body.



A well-insulated building is comfortable inside whether it is hot or cold outdoors. Insulation prevents heat from entering the building in hot weather and from escaping in cold weather.

Much of the heat transfer in a building occurs through the windows. For this reason, insulating windows have two panes of glass with a thin space of air between them. The trapped air does not transfer heat well.

# KEYWORDS: ENGLISH – SPANISH

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Conduction - Conducción

Convection - Convección

Convection Current - Corriente de Conveccion

Radiation - Radiación

Conductor - Conductor

Insulator - Aislante